

Molding Type Module IGBT, Chopper in 1 Package, 1200 V and 50 A


INT-A-PAK

FEATURES

- High short circuit capability, self limiting to $6 \times I_C$
- 10 μ s short circuit capability
- Low inductance case
- Fast and soft reverse recovery antiparallel FWD
- Isolated copper baseplate using DCB (Direct Copper Bonding) technology
- $V_{CE(on)}$ with positive temperature coefficient
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT

PRODUCT SUMMARY

V_{CES}	1200 V
I_C at $T_C = 80^\circ\text{C}$	50 A
$V_{CE(on)}$ (typical) at $I_C = 50$ A, 25°C	1.7 V
Speed	8 kHz to 30 kHz
Package	INT-A-PAK
Circuit	Chopper low side switch

TYPICAL APPLICATIONS

- AC inverter drives
- Switching mode power supplies
- Electronic welders

DESCRIPTION

Vishay's IGBT power module provides ultralow conduction loss as well as short circuit ruggedness. It is designed for applications such as general inverters and UPS.

ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Collector to emitter voltage	V_{CES}		1200	V
Gate to emitter voltage	V_{GES}		± 20	
Collector current	I_C	$T_C = 25^\circ\text{C}$	100	A
		$T_C = 80^\circ\text{C}$	50	
Pulsed collector current	$I_{CM}^{(1)}$	$t_p = 1$ ms	100	
Diode continuous forward current	I_F		50	
Diode maximum forward current	I_{FM}		100	
Maximum power dissipation	P_D	$T_J = 150^\circ\text{C}$	446	W
Short circuit withstand time	t_{SC}	$T_J = 125^\circ\text{C}$	10	μ s
I^2t -value, diode	I^2t	$V_R = 0$ V, $t = 10$ ms, $T_J = 125^\circ\text{C}$	420	A^2s
RMS isolation voltage	V_{ISOL}	$f = 50$ Hz, $t = 1$ min	2500	V

Note

⁽¹⁾ Repetitive rating: pulse width limited by maximum junction temperature

IGBT ELECTRICAL SPECIFICATIONS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Collector to emitter breakdown voltage	$V_{(BR)CES}$	$T_J = 25^\circ\text{C}$	1200	-	-	V
Collector to emitter saturation voltage	$V_{CE(on)}$	$V_{GE} = 15$ V, $I_C = 50$ A, $T_J = 25^\circ\text{C}$	-	1.70	-	
		$V_{GE} = 15$ V, $I_C = 50$ A, $T_J = 125^\circ\text{C}$	-	1.95	-	
Gate to emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$, $I_C = 2$ mA, $T_J = 25^\circ\text{C}$	5.0	6.2	7.0	
Zero gate voltage collector current	I_{CES}	$V_{CE} = V_{CES}$, $V_{GE} = 0$ V, $T_J = 25^\circ\text{C}$	-	-	1.0	mA
Gate to emitter leakage current	I_{GES}	$V_{GE} = V_{GES}$, $V_{CE} = 0$ V, $T_J = 25^\circ\text{C}$	-	-	400	nA

**SWITCHING CHARACTERISTICS**

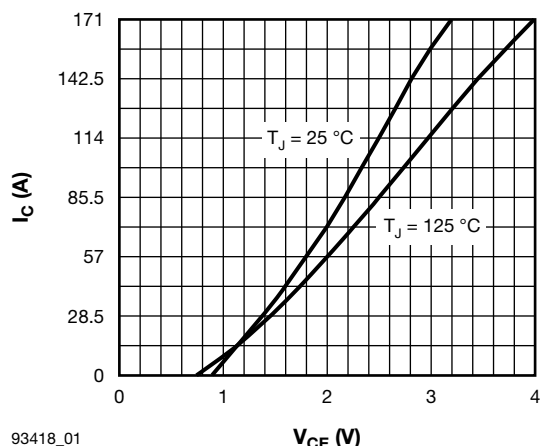
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600\text{ V}$, $I_C = 50\text{ A}$, $R_g = 18\ \Omega$, $V_{GE} = \pm 15\text{ V}$, $T_J = 25\text{ }^\circ\text{C}$	-	220	-	ns
Rise time	t_r		-	60	-	
Turn-off delay time	$t_{d(off)}$		-	420	-	
Fall time	t_f		-	60	-	
Turn-on switching loss	E_{on}		-	2.1	-	mJ
Turn-off switching loss	E_{off}		-	2.6	-	
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600\text{ V}$, $I_C = 50\text{ A}$, $R_g = 18\ \Omega$, $V_{GE} = \pm 15\text{ V}$, $T_J = 125\text{ }^\circ\text{C}$	-	270	-	ns
Rise time	t_r		-	60	-	
Turn-off delay time	$t_{d(off)}$		-	500	-	
Fall time	t_f		-	65	-	
Turn-on switching loss	E_{on}		-	4.1	-	mJ
Turn-off switching loss	E_{off}		-	4.7	-	
Input capacitance	C_{ies}	$V_{GE} = 0\text{ V}$, $V_{CE} = 25\text{ V}$, $f = 1.0\text{ MHz}$	-	4.29	-	nF
Output capacitance	C_{oes}		-	0.30	-	
Reverse transfer capacitance	C_{res}		-	0.20	-	
SC data	I_{SC}	$t_{sc} \leq 10\ \mu\text{s}$, $V_{GE} = 15\text{ V}$, $T_J = 125\text{ }^\circ\text{C}$, $V_{CC} = 900\text{ V}$, $V_{CEM} \leq 1200\text{ V}$	-	270	-	A
Internal gate resistance	R_{gint}		-	10	-	Ω
Stray inductance	L_{CE}		-	-	30	nH
Module lead resistance, terminal to chip	$R_{CC'+EE'}$	$T_C = 25\text{ }^\circ\text{C}$	-	0.75	-	m Ω

DIODE ELECTRICAL SPECIFICATIONS ($T_C = 25\text{ }^\circ\text{C}$ unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Diode forward voltage	V _F	I _F = 50 A	T _J = 25 °C	-	2.15	-	V
			T _J = 125 °C	-	2.35	-	
Diode reverse recovery time	t _{rr}	I _F = 50 A, V _R = 600 V, dI/dt = -2100 A/μs, V _{GE} = -15 V	T _J = 25 °C	-	90	-	ns
			T _J = 125 °C	-	130	-	
Diode peak reverse recovery current	I _{RM}		T _J = 25 °C	-	52	-	A
			T _J = 125 °C	-	60	-	
Diode reverse recovery energy	E _{rec}		T _J = 25 °C	-	1.9	-	mJ
			T _J = 125 °C	-	4.0	-	

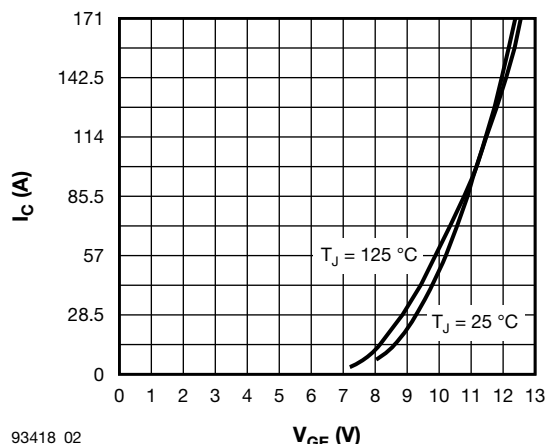
THERMAL AND MECHANICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Operating junction temperature range	T _J		-40	-	150	°C
Storage temperature range	T _{Stg}		-40	-	125	
Junction to case per ½ module	R _{thJC}	IGBT	-	-	0.28	K/W
		Diode	-	-	0.65	
Case to sink	R _{thCS}	Conductive grease applied	-	0.05	-	
Mounting torque		Power terminal screw: M5	2.5 to 5.0			Nm
		Mounting screw: M6	3.0 to 6.0			
Weight			150			g



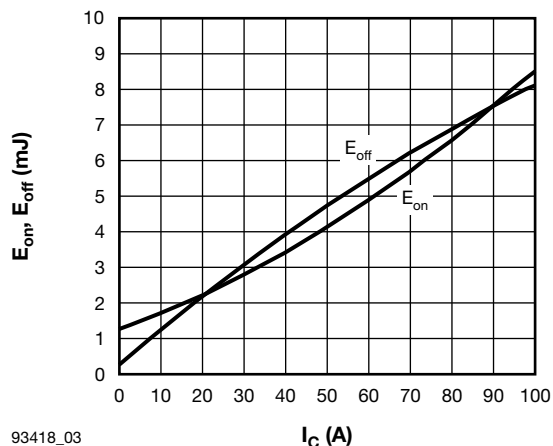
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Fig. 1 - Typical Output Characteristics
 $V_{GE} = 15\text{ V}$



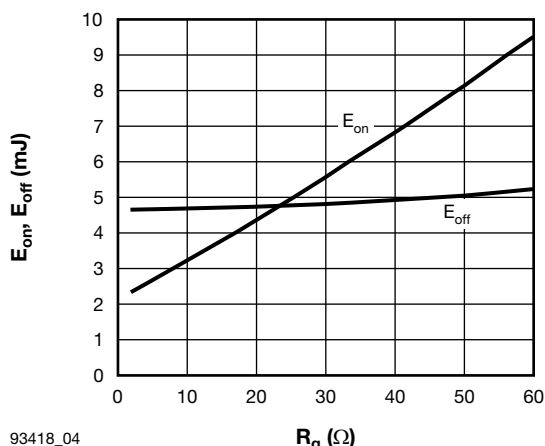
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Fig. 2 - Typical Transfer Characteristics
 $V_{CE} = 20\text{ V}$



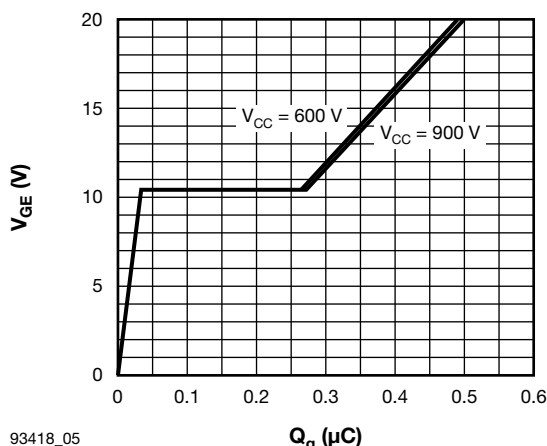
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Fig. 3 - Switching Loss vs. Collector Current
 $T_J = 125\text{ }^{\circ}\text{C}$, $V_{CC} = 600\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $R_g = 18\text{ }\Omega$



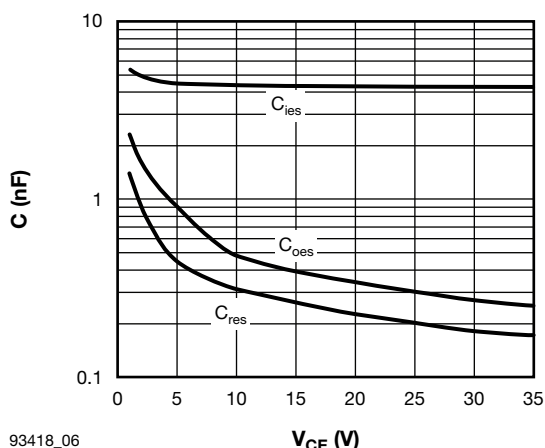
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Fig. 4 - Switching Loss vs. Gate Resistance
 $T_J = 125\text{ }^{\circ}\text{C}$, $V_{CC} = 600\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $I_C = 50\text{ A}$



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Fig. 5 - Gate Charge Characteristics
 $I_C = 50\text{ A}$, $T_J = 25\text{ }^{\circ}\text{C}$



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Fig. 6 - Typical Capacitance vs. Collector to Emitter Voltage

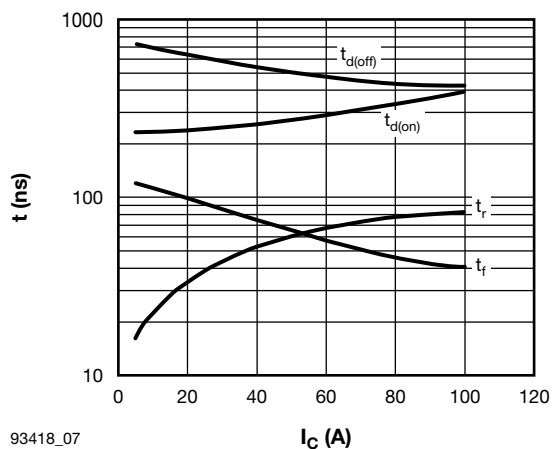


Fig. 7 - Typical Switching Time vs. I_C
 $T_J = 125^\circ\text{C}$, $V_{CC} = 600\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $R_g = 18\ \Omega$

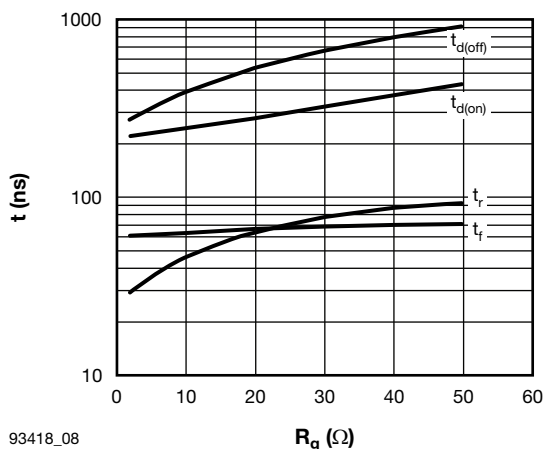


Fig. 8 - Typical Switching Time vs. Gate Resistance
 $T_J = 125^\circ\text{C}$, $V_{CC} = 600\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $I_C = 50\text{ A}$

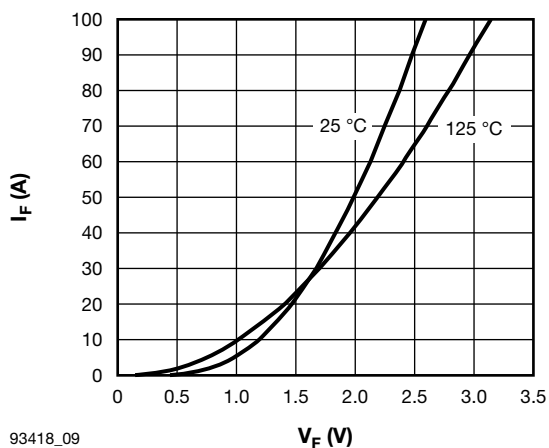


Fig. 9 - Typical Forward Characteristics (Diode)

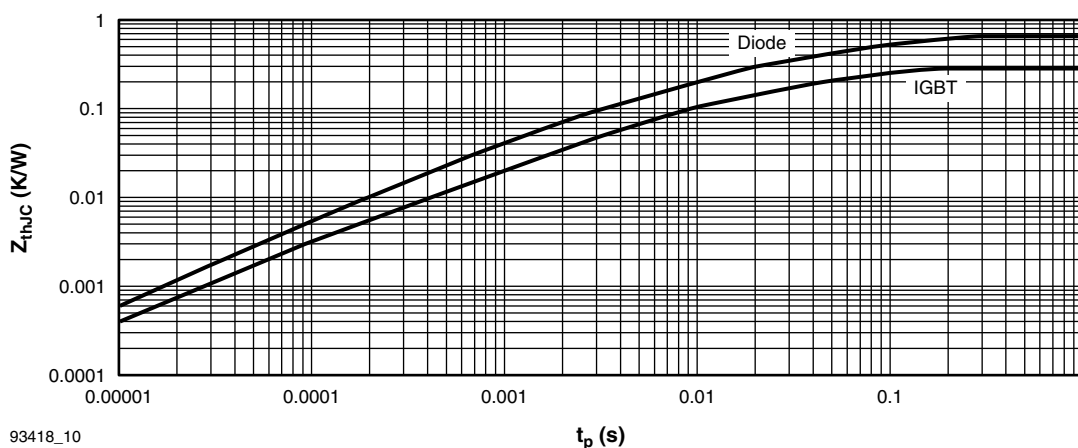
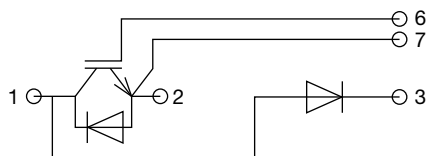


Fig. 10 - Transient Thermal Impedance



CIRCUIT CONFIGURATION



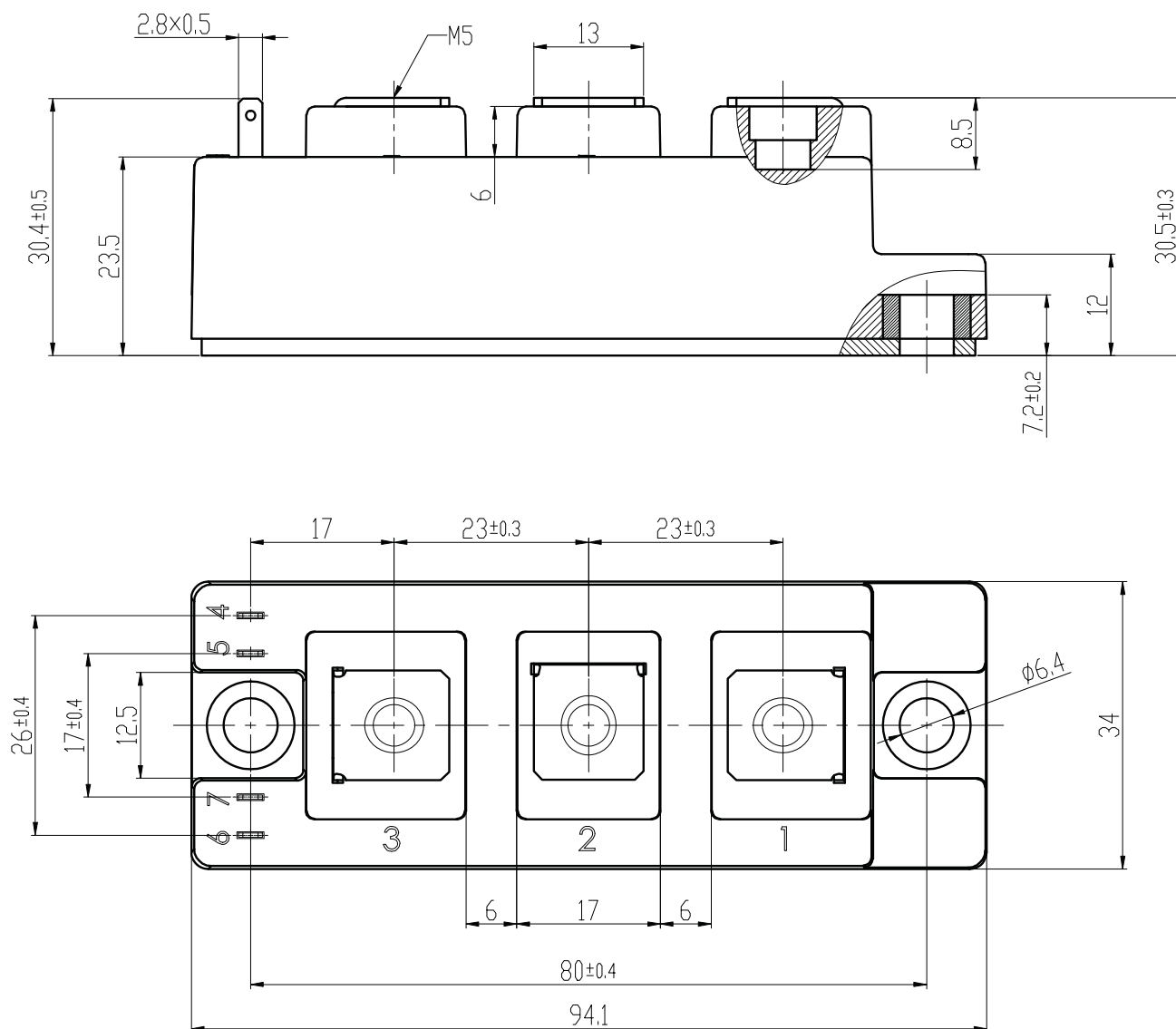
LINKS TO RELATED DOCUMENTS

Dimensions

www.vishay.com/doc?95524

INT-A-PAK

DIMENSIONS in millimeters (inches)





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